

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strike through~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please CANCEL claim 7, AMEND claims 1-6, 8-14, 24, 26, and 29-32, and ADD new claims 42-44 in accordance with the following:

1. (CURRENTLY AMENDED) A method of ~~compressing a grinding sludge containing an oil-based coolant to make~~ providing a compressed solid material, ~~which sludge is a grinding sludge resulting from a hardened steel material,~~ the method comprising the operations of:

filtering a the-grinding sludge to provide a concentrated sludge, the grinding sludge resulting from machining of a hardened steel material and containing an oil-based coolant;

in a first compressing operation, pre-compressing the concentrated sludge in a first press unit; and

in a second compressing operation, compressing the concentrated-pre-compressed sludge in a second press unit by squeezing to ~~thereby~~ provide the compressed solid material.

2. (CURRENTLY AMENDED) The method of providing the compressed solid material ~~compressing the grinding sludge~~ as claimed in claim 1, wherein the grinding sludge before being filtered is a fluid medium containing the coolant in a quantity equal to or greater than 90 wt%.

3. (CURRENTLY AMENDED) The method of providing the compressed solid material ~~compressing the grinding sludge~~ as claimed in claim 1, wherein the compressed solid material formed by the compressing contains the coolant in a quantity within the range of 5 to 10 wt%.

4. (CURRENTLY AMENDED) The method of providing the compressed solid material~~compressing the grinding sludge~~ as claimed in claim 1, wherein ~~during the filtering~~ comprises:

pressurizing and guiding the grinding sludge~~is guided~~ towards a filtering belt, which filters coolant from the grinding sludge; and

is filtered under pressure by utilization of~~asubjecting the grinding sludge to compressed air,~~ to further filter coolant from the grinding sludge.

5. (CURRENTLY AMENDED) The method of providing the compressed solid material~~compressing the grinding sludge~~ as claimed in claim 1, wherein ~~where if~~ a plurality of kinds of ~~the coolants~~ coolant are used in a grinding line, where the grinding sludge is created, the grinding line comprises at least one processing line for each kind of coolant, and the filtering and the compressing are performed for each ~~kind of the coolants~~ processing line in a paralleling fashion.

6. (CURRENTLY AMENDED) The method of providing the compressed solid material~~compressing the grinding sludge~~ as claimed in claim 1, wherein the steel material is component parts of a rolling bearing.

7. (CANCELLED)

8. (CURRENTLY AMENDED) An apparatus making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge which is subsequently compressed by squeezing to provide a compressed solid material, ~~said the apparatus~~ comprising:

a primary press unit, connected with the grinding line, accommodating a predetermined quantity of the concentrated sludge, and pre-compressing the concentrated sludge that has been accommodated; and

a secondary press unit compressing the pre-compressed sludge under a predetermined pressure to thereby provide the compressed solid material,

wherein said primary press unit is coupled to said secondary press unit through a passage through which said pre-compressed sludge passes.

9. (CURRENTLY AMENDED) An apparatus, making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge which is subsequently compressed by squeezing to provide a compressed solid material, ~~said the~~ apparatus comprising:

a primary press unit, connected with the grinding line, accommodating a predetermined quantity of the concentrated sludge, and pre-compressing the concentrated sludge that has been accommodated; and

a secondary press unit, connected with the primary press unit and compressing the pre-compressed sludge under a predetermined pressure to thereby provide the compressed solid material,

wherein the primary press unit is a vertical press having a primary compressing chamber in which the concentrated sludge is pre-compressed in a downward direction and includes a shutter defined at a lower end thereof for discharge of the pre-compressed sludge and wherein the secondary press unit is a transverse press including a secondary compressing chamber having a portion positioned immediately below the shutter receiving the pre-compressed sludge by way of the shutter.

10. (CURRENTLY AMENDED) An apparatus, making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge which is subsequently compressed by squeezing to provide a compressed solid material, ~~said the~~ apparatus comprising:

a primary press unit, connected with the grinding line, accommodating a predetermined quantity of the concentrated sludge and pre-compressing the concentrated sludge that has been accommodated;

a secondary press unit, connected with the primary press unit and compressing the pre-compressed sludge under a predetermined pressure to thereby provide the compressed solid material; and

a sludge supply unit positioned above the primary press unit supplying the concentrated sludge into the primary compressing chamber, said sludge supply unit being a vertical type sludge supply unit including a hopper through which the concentrated sludge is allowed to fall by gravity into the primary compressing chamber through a sludge receiving port of the primary press unit positioned below the hopper.

11. (CURRENTLY AMENDED) The apparatus as claimed in claim 8, further comprising a heater heating the primary press unit to, and maintaining the primary press unit ~~to~~, ~~and at~~, a predetermined temperature range.

12. (CURRENTLY AMENDED) The apparatus as claimed in claim 8, further comprising a press controller controlling a pressing work used for squeezing in the secondary press unit to a predetermined pressure, and a predetermined compressing speed.

13. (CURRENTLY AMENDED) An apparatus, making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge which is subsequently compressed by squeezing to provide a compressed solid material, ~~said the~~ apparatus comprising:

a primary press unit, connected with the grinding line, accommodating a predetermined quantity of the concentrated sludge and pre-compressing the concentrated sludge that has been accommodated; and

a secondary press unit, connected with the primary press unit and compressing the pre-compressed sludge under a predetermined pressure to thereby provide the compressed solid material,

wherein the secondary press unit has a discharge port defined therein to discharge the compressed solid material, and further comprising a transport path following the discharge port, said transport path being divided into two paths, and a sorter selectively switching the compressed solid material, discharged from the discharge port, onto one of the two paths.

14. (CURRENTLY AMENDED) The apparatus as claimed in claim 13, further comprising:

a pressure sensor provided in the secondary press unit; and

a sorting controller, connected with the primary press unit and controlling a switching operation of the sorter by comparing a pressure detected by the pressure sensor with a threshold value.

15. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 8, wherein the coolant contained in the grinding sludge is an oil-based coolant.

16. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 8, wherein the hardened component parts are those of a rolling bearing.

17. (CANCELLED)

18. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 11, wherein the heater comprises a heater disposed in the primary press unit.

19. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 11, wherein the heater comprises a hot air blower blowing a hot air to the primary press unit.

20. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 11, wherein the predetermined temperature range to, and at which, the concentrated sludge within the primary press unit is heated and maintained, is from 20 to 60 °C.

21. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 8, wherein the coolant is oil-based and of a paraffin type.

22. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 8, wherein the primary press unit is a vertical press having a primary compressing chamber within which the sludge is downwardly compressed.

23. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 8, wherein the hardened component parts are ferrous component parts of a rolling bearing.

24. (CURRENTLY AMENDED) An apparatus making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge, which is subsequently compressed by squeezing, to provide a compressed solid material, ~~said the~~ apparatus comprising:

a first press unit, connected with the grinding line and coupled to a second press unit through a passage, where at least one of ~~said the~~ first and second press units has a compressing chamber defined therein compressing the concentrated sludge within the compressing chamber, to thereby provide the compressed solid material; and

a press controller controlling

a pressure in ~~said the~~ at least one first and second press units used to squeeze to a predetermined pressure, and

a predetermined compressing speed.

25. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 24, wherein the press controller is operable to retain the pressure for a predetermined time when the pressure applied attains a target pressure.

26. (CURRENTLY AMENDED) The apparatus as claimed in claim 25, ~~An apparatus making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge, which is subsequently compressed by squeezing, to provide a compressed solid material, said apparatus comprising:~~
a ~~press unit having a compressing chamber defined therein compressing the concentrated sludge within the compressing chamber, to thereby provide the compressed solid material; and~~
a ~~press controller controlling~~
a ~~pressure used to squeeze to a predetermined pressure, and~~
a ~~predetermined compressing speed,~~
wherein the ~~press controller is operable to retain the pressure for a predetermined time when the pressure applied attains a target pressure, and wherein the predetermined time during which the pressure is retained is equal to or greater than 10 seconds.~~

27. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 25, wherein the press controller repeatedly performs an operation to retain the predetermined pressure for the predetermined length of time a number of times during a period in which the pressure used to squeeze is progressively increased.

28. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 27, wherein the predetermined time over which the pressure is retained during the period in which the pressure is progressively increased is within the range of 2 to 3 seconds.

29. (CURRENTLY AMENDED) The apparatus as claimed in claim 24, ~~An apparatus making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge, which is subsequently compressed by squeezing, to provide a compressed solid material, said apparatus comprising:~~

~~a press unit having a compressing chamber defined therein compressing the concentrated sludge within the compressing chamber, to thereby provide the compressed solid material; and~~

~~a press controller controlling~~

~~a pressure used to squeeze to a predetermined pressure, and~~

~~a predetermined compressing speed,~~

wherein the press controller is operable to slowly reduce the compressing speed.

30. (CURRENTLY AMENDED) The apparatus as claimed in claim 24. ~~An apparatus making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge, which is subsequently compressed by squeezing, to provide a compressed solid material, said apparatus comprising:~~

~~a press unit having a compressing chamber defined therein compressing the concentrated sludge within the compressing chamber, to thereby provide the compressed solid material; and~~

~~a press controller controlling~~

~~a pressure used to squeeze to a predetermined pressure, and~~

~~a predetermined compressing speed,~~

wherein the press controller applies the pressure to squeeze up to or lower than approximately 400 MPa.

31. (CURRENTLY AMENDED) The apparatus as claimed in claim 24. ~~An apparatus making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge, which is subsequently compressed by squeezing, to provide a compressed solid material, said apparatus comprising:~~

~~a press unit having a compressing chamber defined therein compressing the concentrated sludge within the compressing chamber, to thereby provide the compressed solid material; and~~

~~a press controller controlling~~

~~a pressure used to squeeze to a predetermined pressure, and
a predetermined compressing speed,~~

wherein the press unit drives a pressing member using a ball screw mechanism driven by an electric motor.

32. (CURRENTLY AMENDED) The apparatus as claimed in claim 24, ~~An apparatus making a compressed solid material by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line grinding hardened component parts, by filtering the grinding sludge to provide a concentrated sludge, which is subsequently compressed by squeezing, to provide a compressed solid material, said apparatus comprising:~~

~~a press unit having a compressing chamber defined therein compressing the concentrated sludge within the compressing chamber, to thereby provide the compressed solid material; and~~

~~a press controller controlling~~

~~a pressure used to squeeze to a predetermined pressure, and
a predetermined compressing speed,~~

wherein the hardened component parts are ferrous component parts of a rolling bearing.

33. (PREVIOUSLY PRESENTED) The apparatus as claimed in claim 24, wherein the coolant is an oil-based coolant.

34. (WITHDRAWN) A compressed solid material prepared by compressing a grinding sludge containing a coolant, which sludge is produced in a grinding line for grinding hardened component parts, by squeezing, said compressed solid material being of a hollow cylindrical shape having a hollow defined therein.

35. (CANCELLED)

36. (PREVIOUSLY PRESENTED AND WITHDRAWN) The compressed solid material as claimed in claim 34, wherein the coolant in the compressed solid material is an oil-based coolant, the amount of said oil-based coolant being within the range of 5 to 10 wt%.

37. (PREVIOUSLY PRESENTED AND WITHDRAWN) The compressed solid material as claimed in claim 34, wherein the hardened component parts are ferrous component parts of a rolling bearing.

38. (PREVIOUSLY PRESENTED AND WITHDRAWN) A grinding sludge recycling method for recycling a compressed solid material of the grinding sludge as a material for steel production, said recycling system comprising filtering the grinding sludge, produced in a grinding line for grinding hardened component parts, to provide a concentrated sludge which is subsequently compressed by squeezing to thereby provide the compressed solid material while a coolant separated from the grinding sludge during filtering and compressing processes is returned to the grinding line.

39. (WITHDRAWN) The grinding sludge recycling method as claimed in claim 38, wherein the hardened component parts are steel material used for bearings.

40. (PREVIOUSLY PRESENTED AND WITHDRAWN) The grinding sludge recycling method as claimed in claim 39, wherein where a plurality of kinds of coolants are used in the grinding line, a plurality of processing lines are distributed depending on the kinds of the coolants used, each of said processing lines including means for performing the filtration, means for compressing by squeezing, a transport path for transporting the grinding sludge from the grinding line to the filtering means, and coolant recovery passages for returning the associated coolant from the filtering means and the compressing means back to the grinding line.

41. (PREVIOUSLY PRESENTED AND WITHDRAWN) The grinding sludge recycling system for recycling a grinding sludge produced in a grinding line for grinding hardened component parts, said recycling system comprising:

- a transport means for transporting the grinding sludge;
- a filtering means for filtering the grinding sludge so transported to thereby provide a concentrated sludge;

a compressing means for compressing by squeezing the concentrated sludge to thereby provide a compressed solid material; and

coolant recovery passages for returning a coolant separated from the grinding sludge during filtering and compressing processes back to the grinding line.

42. (NEW) The method of compressing the grinding sludge as claimed in claim 1, wherein the concentrated sludge, before being compressed, is a fluid medium containing the coolant in a quantity approximately 50 wt%.

43. (NEW) An apparatus for making a compressed solid material, comprising:
a primary press unit, receiving a sludge concentrated by filtering, accommodating a predetermined quantity of the concentrated sludge, and pre-compressing the concentrated sludge that has been accommodated, the sludge containing a coolant and being produced by machining of hardened steel; and

a secondary press unit, connected with the primary press unit via a passage through which the pre-compressed sludge passes, and compressing the pre-compressed sludge under a predetermined pressure to provide the compressed solid material.

44. (NEW) An apparatus for making a compressed solid material, comprising:
a primary press unit, receiving a sludge concentrated by filtering, accommodating a predetermined quantity of the concentrated sludge, and compressing the accommodated, concentrated sludge under a first predetermined pressure, the sludge containing a coolant and being produced by machining of hardened steel; and

a secondary press unit, connected with the primary press unit, receiving the sludge compressed by the primary press unit, and compressing the sludge under a second predetermined pressure to provide the compressed solid material.